ARTICULATED TILTING TONGUE FOR RIGIDIFYING AND/OR PROTECTING THE FRONT FACE OF A SHOE AND MORE PARTICULARLY A SNOW SURF BOOT

The present invention relates to the addition to a shoe, and more particularly a snowboard boot, of a system for stiffening and/or protecting the front surface of said shoe. This system is constituted by a front cover, which is removable or irremovable, rigid or semi-rigid, and by a device serving as a fixing point therefor, which is inserted into, beneath, or on both sides of the front half of the sole, enabling the system to be affixed temporarily or permanently to the shoe, independently of the vamp or upper, while enabling front-to-rear mobility of the cover with respect to this fixing point.

This novelty can lend itself to applications in various fields:

shoes requiring protection for the vamp, instep, and tibia;

safety boots;

motorcycle boots or the like;

shoes requiring the foot to be supported with variable rigidity;

protection and/or support of the ankle or the forefoot;

shoes requiring a power of transmission of the forces to which they are subject by limiting the loss or lack of focus of energy associated with the deformation, while ensuring comfort and plantar sensitivity for their user; and

shoes for leisure and sports-rollers, hiking, and more particularly shoes adapted to be affixed to a sports apparatus, especially for gliding sports, ski outings, alpine skiing, snowboarding, but also for other sporting activities such as snowshoeing, etc.

The present development applies to the addition of the device to a snowboard boot or shoe, but is of course not limited to such an application.

The current techniques attempt to combine a satisfactory user's comfort, heat, imperviousness, flexibility, absence of hard spots in the liner, light plantar sensations, with a rigidity of the footwear which satisfactorily respond to the mechanical stresses, forces exerted on the binding, on the board, and to the biomechanical stresses, optimum transmission of the forces from the snowboarder to the board.

These techniques propose solutions which unevenly deal with the rigidity to comfort ratio. Indeed, either the flexural rigidity of the shoe is high and the shoe has a heavy and rigid sole, which hinders plantar sensations, comfort when putting on or removing both the

shoes and the snowboard, and ease of walking, or the flexural rigidity of the boot is low, and the shoe can be comfortable, but the force transmission quality is poor. Thus, the rigidity in extension, via the support of the rear surface of the leg on the rear upper, causes a lift of the forefoot, which, depending on the forces exerted, causes a torsional deformation of the shoe. In addition, any attempt to resolve these problems most often calls for an increase in the number of pieces or inserts necessary to hold the foot, both on the shoe and on the board and its binding, which hinders the ease and pleasure in using the assembly.

Finally, the existing systems are not very adaptable, do not allow any rigidity adjustment, etc., and cause the boot to be highly specific with respect to the diversity in the current snowboarding practices.

Currently, three shoes or boots/bindings principles can be distinguished. The first, which is the oldest, consists of a flexible boot, with no particular reinforcement, whose rigidity is provided by the so-called "shell" binding system mounted entirely on the board. It has a device for affixing the shoe on the board, constituted of a rigid plate positioned flat on the board ensuring the boot/board connection, which supports, in its rear portion, a rear cover or spoiler ensuring the rear support of the boot, a system of straps or ratchets holding the heel by covering the instep/ankle juncture and, in its median or front portion, another strap or ratchet holding the forefoot against the aforementioned plate.

The second principle, so called "step-in," has a binding system which only affixes the shoe and the snowboard. The shoe then has reinforcements inside the footwear in the form of plastic inserts located only between the rear upper and the liner (integrated spoiler), a more rigid sole than the previous one, and external reinforcements in the form of straps latching the upper portion of the ankle and the instep.

The last principle is a combination of the previous ones, wherein the rear upper reinforcement is seen, either on the binding, or fixed externally to the rear surface of the shoe. These two last principles have a generally higher rigidity than the first boots/bindings principle for a greater weight as well, a loss of gliding plantar sensations and a flexural rigidity directly associated with the aging of the material constituting the footwear and with the intensity of the activity.

The object of the present invention is to overcome the aforementioned disadvantages, and more particularly to propose a solution to the problem of controlling the front-to-rear rigidity of the shoe, while preserving an optimum plantar sensitivity.

Another object of the present invention is to also provide an adaptable system

making it possible to vary the flexural stiffness of the shoe as a function of the intended use, or yet as a function of the user.

A last object of the present invention is to provide a shoe construction enabling an optimum transmission of the forces from the user's leg to the sports apparatus.

The invention is directed more particularly to a movable and/or detachable front cover assembly, which can be referred to as "front spoiler" in relation to the rear spoilers which nowadays equip the snowboard boots or their binding, and to its attachment to the front portion of the boot sole.

According to the invention, this cover or stiffening device is capable of covering the front surface of the shoe, and extends from the flexion fold zone up to the front end zone of the sole.

The cover, of variable shapes and rigidity, interchangeable or fixed, can cover and completely or partially hold the instep and/or the instep and the bottom of the front surface of the leg.

Its bilateral method of attachment to the shoe, according to one of the embodiments, determines therefor a front-to-rear travel that makes it possible to define an open position which completely releases the vamp and allows putting on/removing the shoe, lacing/unlacing or any other tightening/loosening method, while remaining affixed to the front end of the shoe.

By folding the cover against the front portion of the boot, a closed position is defined during which, depending on its form, it can completely or partially cover the front portion of the boot. It then partially or completely covers the footwear tightening system and protects it.

It is affixed to the rear upper or to a spoiler, dependent on or independent of the shoe, by one or more existing arrangements of straps and/or buckles or hooks, which immobilize its upper portion. It can itself constitute the support, completely or partially, of this same material. This configuration makes it possible to affix the front and rear surfaces of the shoe with a degree of cohesion selected by the user during tightening, from a substantial stiffness up to a substantial flexibility.

In the case of a detachable fixing method, the possibility to quickly replace a cover of different shape and/or rigidity enables the shoe characteristics to be adapted to the snowboarding levels and conditions. Finally, the cover itself can have movable parts, arms journalled to the cover by riveting, enabling it to adapt to the various boot volumes and/or

sizes. The cover is manually actuated.

The method of attaching the cover on the boot can be fixed or detachable. In any case, the cover is attached on the sole irrespective of the vamp and is housed beneath, inside, or on both sides of the sole in its plantar portion.

Beneath the sole, the insert for attaching the cover can be constituted of a shaft, whose technical characteristics will be detailed subsequently, arranged transversely with respect to the longitudinal axis of the shoe, and its trajectory cuts into the wear surface of the sole. If the fixing insert is housed within the latter, a recess is provided in the sole to ensure the passage and retention of the shaft.

The front end of the cover, composed of two lateral arms or legs each bored with a hole having the diameter of the shaft, is affixed to each end of the shaft by a nut, if the ends of the shaft are threaded, or by clipping, or by any other retaining method. If the surfaces selected for insertion are the lateral edges of the sole, two non-traversing inserts are positioned by partial boring of the sole, and the cover is fixed thereto as previously, or by a tenon/mortise system, or by snap fastener, or by any other fixing method.

The various devices for fixing the cover form the journal that provide the latter with its front-to-rear mobility, already described, and makes it possible to define the aforementioned opened/closed positions. In the case where the cover is fixed to a transverse shaft extending through the front of the sole at a level located at the base of the toes, this shaft contributes to ensuring the lateral and torsional rigidity of the front of the shoe while preserving in the sole the flexibility necessary to the plantar sensations.

The assembly of the elements described has a removable system affixed to the boot, enabling the boot to resist the deformation by crushing in bending.

The definitions of the constituent elements of the invention make it possible to bring out the characteristics of the improvement made to the shoe by adding this system. It improves the mechanical and comfort properties of the boot.

Mechanical properties: high rigidity which can be adjusted by tightening and/or replacement of the cover by a cover of different rigidity; increase in the flexural rigidity; synergic operation of the cover and of the rear upper; torsional rigidity of the front of the sole without hardening, and preservation of the plantar sensations; improved transmission of the forces to the board by the cohesion of the shoe assembly and a more direct transmission of the forces from the leg down to the foot.

Comfort properties: the footwear and liner can be made lighter; the front portion of

the boot can be flexible; the cover protects the integrity of the lacing system and can protect from the cold, frost, rain, etc. A certain lateral flexibility at the level of the ankle can be preserved. The device can be adapted to the size and/or to the volume of the shoe by mounting movable arms. The simplicity of the device makes it very easy to use and highly reliable.

In any event, the invention will be better understood by means of the description that follows, with reference to the annexed schematic drawings showing, by way of non-limiting examples, an example of a preferred embodiment, and in which:

Figure 1 is an exploded perspective view of the various elements forming the stiffening device.

Figure 2 is a perspective view of the shoe and shows the trajectory of the channel 8 provided within the sole and the presentation of the shaft that is housed therein.

Figure 3 is a view similar to Figure 2 and shows the device in position, the cover 1 being folded over the keepers which receive the lacing system, the definition of the thickness of the sole 17 and of the front arch 4 connecting the two arms 2.

Figures 4 and 5 are side views of the shoe and show the tilting of the cover 1 defining the aforementioned open (Figure 4) and closed (Figure 5) positions, and the positioning of the already existing tightening means which functionally ensure the fixing of the device in its upper portion.

Figures 1-5 show a shoe 10, in this case adapted to snowboarding, equipped with a cover 1 according to the invention. This cover 1 substantially has the shape of a tile capable of covering the front portion, i.e., the front of the shoe 10, from its tibial support zone 20 up to its front end 22, including the flexion fold zone 21. The cover 1 is extended at the front by two lateral arms 2 extending up to the level of the sole 9 of the shoe. As will be explained in more detail later, the cover 1 is fixed to the shoe, to the sole 9 at the level of the metatarsophalangeal articulation zone or of the base of the toes via its lateral arms 2, on the one hand, and to the upper of the shoe 10 at the level of the instep 21 and/or of the tibial support by tightening straps 13 of a known type, on the other hand.

Furthermore, the cover 1 covers the zone 12 for closing, in particular by lacing, the front portion of the upper.

The cover 1 can have a wide variety of shapes, sizes, contours, enabling the guiding and/or insertion of belts, straps, slots, materials, in order to obtain the desired level of rigidity.

In any event, it has the shape of a pseudo-anatomical recessed tile corresponding to the front portion of the boot which it must cover in closed position (Figure 5). A cover 1 obtained by molding or by thermoforming of a rigid or semi-rigid plastic currently offers a possible solution. Other materials, in particular composite materials, can lend themselves to other applications.

The upper limits in the height of the cover 1 enable it to extend to the maximum from the tip of the foot 22 to the top 23 of the upper 10 of the boot, without overlapping neither the latter for reasons of comfort, nor the tip of the foot to enable a 1/14 tilting that releases the vamp in the case where said cover is pivotally mounted.

Its maximum lateral limits can be located at the upper edges of the sole 9 for the vamp and the instep.

In the embodiment shown where the cover is journalled, it has, at its front end, two arms 2 made of the same material and without interruption of the material, or legs, each bored with a hole 3, or bearing a tenon or mortise or snap fasteners or other types of fixation. In the example, the arms are bored. They are directed toward the lateral edges of the sole so as to connect to the lateral ends of the insert(s) 5 carried by the sole. At the front end of the cover, an arch 4 made of the same material and without interruption of material, joins these two arms 2.

The sole insert 5 is, for example, inside the sole 9, and extends through this insertion method having a lateral and torsional stiffening of the front sole. It is in the form of a shaft. It can be metallic, plastic or the like, rigid, semi-rigid, or even flexible in the case of a cable. Its ends 16, flush with the outside of the lateral edges 17 of the sole 9 are, in the example, provided with a threading 16 enabling the arms 2 of the cover 1 to be fixed. This shaft can extend through the sole 9 in a zone 9A of the latter, going from the front end of the plantar arch 9B up to the front end 9C of the shoe.

In the case of a rigid shaft, by way of example, it seems that a diameter of 4 millimeters represents a maximum such that the latter is not felt by the user.

In the example shown, the shaft 5 transversely extends through the sole 9 at the level of the toes for comfort and optimum efficiency in torsion. The installation of this shaft 5 can be undertaken during molding when the sole is constructed, by installing or making a permanent hollow channel 8 receiving the latter, enabling a free clearance in sagittal rotation of the shaft and/or its replacement or extraction, temporary or permanent. The shaft 5 can also be introduced after boring a channel 8 having the diameter of the shaft 5 in the thickness

of the sole 9.

The affixation of the cover 1 on the shaft 5 occurs in the following manner: in the example, the holes 3 bored at the end of each arm 2 are each housed around the flush and threaded ends 16 of the shaft 5 and are maintained therein by an anti-loosening washer 6 and a nut 7 which covers each end 16 of the shaft 5. Each arm 2 is affixed to the shoe by tightening the nuts 7 according to a torque preventing loosening and avoiding the deformation of the shoe. The pivoting of the cover 1 in a front-to-rear direction is then possible by mere manual action. The inner surface of the arms 2 rests against the lateral edges of the sole 17.

The entire device described finds its industrial application in the field of boots in general, boots for leisure and sports, and more particularly in the field of boots for practicing a sport by means of an apparatus to which said shoes are affixed; a non-limiting example thereof is the snowboard boot. In this case, it can be adapted to almost all of the existing models.

Of course, and as explained hereinabove, the present invention is not limited to the embodiment described. Thus, the cover can be fixed in a removable manner, and can be provided to be interchangeable with a cover of different rigidity for an adaptation to a different activity or user. The method of fixing the cover on the sole can also obtained differently, either on the sides thereof, or by a traversing insert in a form that is not necessarily cylindrical.